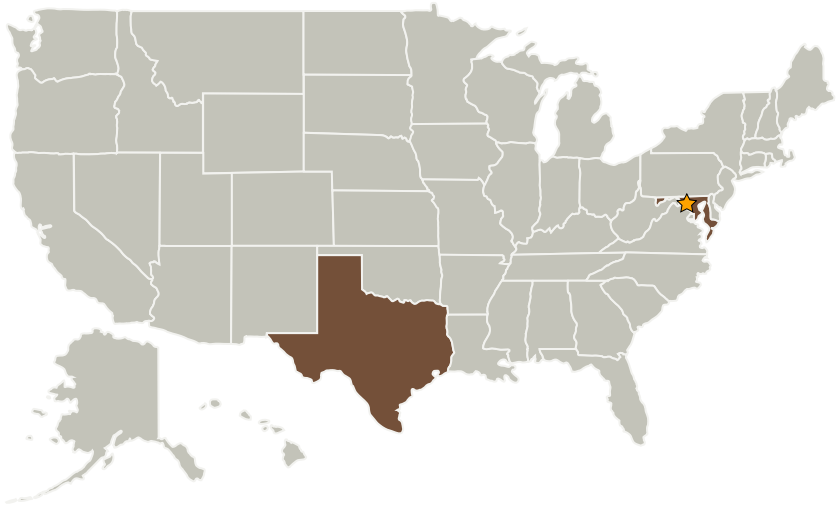
Hyperspectral Polarimeter for Monitoring Balloon Strain, Phase I

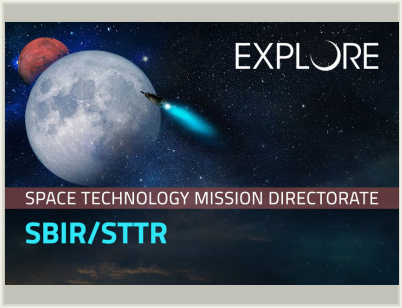
Completed Technology Project (2006 - 2006)

Project Introduction

NASA's latest generation of superpressure, ultra long duration balloons (ULDB) extend the flight time for stratospheric experiments to levels previously unattainable with zero-pressure balloons, while maintaining established load and altitude capabilities. However, the co-extruded polyethylene film structure of these balloon gores must sustain pressure differentials of 240 Pa without loss of structural integrity for 100 days or more. At present, there is no in-situ means for monitoring the strain in balloon gores to determine if a failure is imminent or if corrective action is necessary. Lynntech proposes an optical device which utilizes the birefringence of balloon film, the natural linear polarization of scattered sunlight, and a new technology for producing hyperspectral images to monitor all balloon strain continuously, in-flight, from a single point of reference. The Hyperspectral Polarimeter (HP) will generate real-time strain maps of the balloon by monitoring the birefringence of the gore material, which is linearly proportional to the film strain. An interference spectrum is measured for each pixel of a detection CCD array, enabling the construction of a two-dimensional map of the overall balloon strain. This new, light, and compact technology will enable unprecedented capability for NASA to continuously monitor balloon film strain throughout flights.

Primary U.S. Work Locations and Key Partners





Hyperspectral Polarimeter for Monitoring Balloon Strain, Phase I

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

Hyperspectral Polarimeter for Monitoring Balloon Strain, Phase I

Completed Technology Project (2006 - 2006)

Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Lynntech, Inc.	Supporting Organization	Industry	College Station, Texas

Primary U.S. Work Locations	
Maryland	Texas

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.3 Thermal Protection Components and Systems
    - TX14.3.5 Thermal Protection System Instrumentation